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GENERAL INTELLIGENCE OR "SCHOOL BRIGHTNESS."

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The problem of "general intelligence" is one which for some time has engaged the attention of differential psychologists. At first the assumption seems to have been that intelligence is some central ability which comes into function in every mental operation, and that if a person has a certain degree of intelligence in one direction, and if allowance is made for practice, experience, and acquired interest, he will be found to have about the same degree of intelligence in other directions. If this were true it would follow that a test, and a single test at that, might be found which would approximately eliminate practice, experience and interest, and thus serve as a measure for the central ability itself.

As experimental work proceeded, a great deal of skepticism arose as to the existence of any such central ability, or at least as to its significance as a markedly propotent factor in a given individual's intellectual performance. The hope of finding a single suitable test was given up and a combination of tests designed to measure different sides or kinds of intellectual performance, was sought for. These need not correlate with one another, but taken as a whole should correspond with

other indications or estimates of intelligence, such as age, or the opinion of people sufficiently acquainted with the individuals measured. In the case of children the opinion of teachers or class standing has usually been taken as a standard of comparison.

The "Binet tests" give us an example of such combined or resultant tests, but these are without significance for adults or even for children beyond thirteen or fourteen. They are also probably without much significance as a prophecy of future intellectual capacity in adult life, and must be regarded as indicating nothing more than a certain degree of maturity. As is well known, the approach to maturity presents many fluctuations, and children may pass and repass one another at various points in their development without justifying any conclusion as to their permanent intellectual power. The wide limit of three years' retardation required by the Binet scale as an indication of intellectual arrest is probably not too great for even approximate security.

The Binet scale, moreover, relies on tests which have no connection with intelligence in adult life. Rote memory, for example, has been shown to increase with age until about fourteen or fifteen, and after that to remain stationary. It gives an indication, therefore, of psychological age and in the case of children will give positive correlations with other tests involving age or maturity of intelligence. With adults, however, repeated investigations (including this one by the present writer) have shown no clear positive correlations with other measures of intelligence. It might seem from this that at one stage of growth an ability might be taken as an indication of a general power to produce intellectually, while at another age it could play no such role. If, however, one measured the size of the foot in children or the solidification of the epiphyses as has been done by Rotch, a correlation would likewise be found with age, and with general intellectual capacity as dependent on age. Size of feet or solidification of epiphyses might be as reliable indications of psychological age as rote memory. There is, however, no proof that any of them have a causal or contributive relation to intelligence. A superior rote memory at a given age, however useful as an

indication of maturity, cannot therefore be regarded as a reliable promise for the future, as far as intelligence is concerned.

It is possible, and even probable, that no combination of tests will ever be found that will reveal and measure with sufficient certainty the varying degrees of intelligence of adults of different social positions, different occupations, different conditions of health and temperaments, and different moral and emotional characteristics. Differentiation due to the working of these various factors must make profound changes, not perhaps in the formal intellectual ability, if such exists, but in the direction of attending, perceiving, grasping, associating, assimilating, conceiving, comparing, judging and thinking and whatever else may be distinguished as purely intellectual functions. How, for example, can a person who works mainly in words and their meaning be compared intellectually with one who works mainly in terms of material adjustments, whether of an artistic or of a scientific character? The best we could hope to do would be to arrive at separate scales adapted to the various stages of each different line of accomplishment. How high any point in one may be as compared with the corresponding point in another it would be impossible to say.

If these considerations are justified, it is only at that stage of life when growth is practically over (degree of maturity being thus excluded), and before differentiation has set in to any marked degree, that we should expect to find tests that would reasonably correspond to other estimates of intelligence. The ninety-four pupils of the entering class of the Boston City Normal School fulfil these conditions to a very great extent. They have been selected by agencies and subjected to influences which would tend to make those who enter much alike. They are all about the same age. Those of poor health are excluded. They have all had practically the same four years' high school course. They have passed the same entrance examinations. They dress alike and social prejudice exists against much variety. They are largely of the same race and social position. A large number of them, probably over half, judging from a previous inquiry made in Chicago,

have the same ambition to be teachers and desire personally, apart from home pressure, to prepare themselves for that position. The leveling influences of school and society have worked upon them to an extent probably not to be found in many other classes in the community.

And yet, of course, differences, including intellectual differences, appear among them, although the school environment puts a premium upon a particular kind rather than upon a variety of kinds of intellectual attainment. One of the factors here is the marking system which gives to those standing at the head of the list formed by the standings in all the subjects for the three years course, the first opportunity in obtaining a position. There is, accordingly, a strenuous struggle for marks rather than for a natural development, a condition which tends to prevent differentiation and to reduce intellectual performance to a single type. However regrettable this may be, it is probably better than the giving of appointments by personal or political pull.

The conditions described make it feasible to inquire as to the nature of the intellectual functions, which under these conditions give the impression to others of general intelligence or "brightness," and to seek for tests which will measure this ability. The result of this will not give us a measure of general intelligence that will be applicable to fields of activity other than the field of this school or one like it. It ought, however, (1) to manifest the type of intellectual functions which the organization of a school as a whole calls into play and thus indicate something of its efficiency; and (2) to measure the varying degrees of this intellectual function among the pupils in such a way as to show it free from association with aspects of character and effort such as social attractiveness, perseverance, industriousness or ambition, and independent of the struggle for marks.

The tests arrived at were selected from a number of tests made throughout the course of the year, and these were compared with judgments made by fellow pupils and by teachers on each individual as to her "general intelligence" or "brightness." These latter were made after an acquaintanceship of at least six months. The class is arranged in sections

so that sixteen or seventeen pupils are in one section and, as these all take the same subjects, each individual pupil is exceptionally well acquainted with the other pupils of that section as far as their work in school is concerned. This acquaintanceship includes not only observation in class but experience with them outside of class, in some cases previous experience in high school and in a few cases experience at home. Each pupil was asked to rank her comrades according to the impression they had made upon her as to their "brightness" from whatever sources she had gained this impression. In cases where differences were difficult to decide the individuals were to be grouped as equal. Remarks were to be placed opposite the names of those ranked, indicating the kind and source of the impression recorded. It was promised that the list so provided would be kept absolutely confidential as far as the pupils were concerned, and each was cautioned against communicating with others or inquiring as to ranking in regard to other pupils. The purpose of the ranking was pointed out to the pupils and it was seen that an average from the combined lists would give us a standard of comparison which would throw some light on the tests we had been making throughout the year. The proposal was entered into by the class with interest and willingness and, although the statement was clearly and emphatically made that, if any individual did not wish to make a list, she would be excused without question, there was no one who did not pass one in.

It is the impression of the present writer that these lists were prepared with a great deal of care and discrimination. This was shown by the remarks, and by various events which occurred. One of these will indicate what is meant. In one section, (Section 1) there are two sisters, one of whom is placed by the class average at the top. Her sister who is older, also judges her in this position. The elder sister is placed by the class average as fifth and this is also where the younger sister places her.

The accompanying table (Table I) gives the ranking in this same section and shows the general average with the probable errors. The line at the bottom gives the correlations of the judgments of each observer with the rank list obtained by

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	Total.	Av.	P. E.	P. E. m.	Position.
A		3	1	1½	1	1	3½	1	2½	2	1	1½	8	6½	4	8	2	47.5	2.97	1.61	.40	1
B	1½		3½	5	3	2	3½	2½	2½	2	4	3½	1½	1	5	7	4	50.5	3.16	1.20	.30	2
C	1½	5		1½	4	6	3½	2½	5½	7	2	1½	1½	5	3	6	1	56.5	3.53	1.33	.32	3
D	5½	2	3½		2	5	3½	7	5½	4½	7	5	13	2	1	4	3	71.5	4.47	1.53	.38	4
E	5½	1	2	3		3½	3½	5	7½	6	3	3½	13	6½	2	5	8½	78.5	4.90	1.73	.43	5
F	3½	5	14	7	5		3½	5	2½	2	10	11	4	3½	6	2	5½	82.5	5.14	1.99	.49	6
G	3½	5	13	4	6	3½		5	2½	·4½	6	9	13	3½	7	1	5½	92	5.75	2.23	.55	7
H	7½	7	5	6	8	9	8		7½	9	5	8	5½	10	8	11	8½	123	7.75	1.08	.27	8
I	7½	9	12	13	7	7	10	12		8	9	10	3	9	9	3	8½	137	8.50	1.67	.42	9
J	10	10	9½	12	10	13½	8	9½	10		8	6	13	12	13	9	8½	152	9.50	1.31	.32	10
K	10	11½	6½	8½	11	15	14	9½	10	14		12	13	9	15	15	13	172	10.75	1.99	.49	11½
L	10	13	6½	12	14	8	11½	9½	10	11	11		8	11	11	14	13	173.5	10.84	1.40	.35	11½
M	13	14	9½	12	9	11	15	14½	13	10	15	13½		10	10	11	13	197	12.31	1.39	.35	14
N	13	8	9½	8½	14	12	8	9½	13	12½	14	7	13		14	11	13	180	11.25	1.75	.44	13
O	15	11½	15½	12	12	10	13	14½	13	15	13	15	5½	13½		13	13	205	12.81	1.39	.35	15
P	13	15	9½	15½	14	13½	11½	14½	15½	12½	12	13½	8	9	12		13	212	13.25	1.42	.35	16
Q	16	16	15½	15½	16	16	16	14½	15½	16	16	15½	15½	15	16	16		248	15.50	.03	.008	17
Av. Dev. from Class Av.																						
	1	1.4	2.8	1.87	1.19	1.19	1.75	1.19	1.45	1.56	1.62	1.75	4.04	2.22	1.71	3.12	1.43					
Correlations.																						
r =	.96	.92	.65	.89	.94	.94	.90	.94	.92	.90	.88	.80	.38	.80	.88	.67	.91	Av. r = .84.				

TABLE I.—The letters stand for individuals. The vertical columns under each letter are the positions given to the rest by the individual represented by that letter.

averaging the judgments of all. The same kind of table was prepared for each of the six sections into which the class is divided.

The probable errors here follow quite a different order from that found by J. McKeen Cattell in his "Statistical Study of American Men of Science," 2nd ed. Professor Cattell found that the probable errors increased as the lower end of the list was reached, and he assumes that this was due mainly (page 549) to real differences between the men judged and not to "less knowledge of those whose work is less important." It would seem from the present data that when the individuals judged are equally well known no more difference of judgment is found at the bottom than at the top of the list. This obtains, however, as far as the whole list is concerned, under the condition that the whole number judged are given and not selected from a number twice as large, as in the Cattell investigation. The lower part, however, of the upper half of the present list shows no increase in probable error and here, except for the smaller number, the conditions are the same as in the Cattell inquiry.

It will be noticed that the individual at the bottom of the list has an extraordinary small probable error. The remarks, however, indicated some lack of acquaintanceship on the part of the observers with this pupil. The low probable error, instead of indicating certainty, under these conditions indicates some abnormal or unusual social condition. When this was discovered, investigation was made as to the home conditions for study on the part of this pupil and it was found that they were of a strongly inhibitory character. This prevented her from doing her best and, along with the fact that this pupil was of foreign birth, tended to isolate her and practically prevent her from having any appreciator among her classmates.

After these estimates were all in and the results tabulated, the pupils were asked to say confidentially where they would place themselves in the list if they had been asked to do this. They were told that if they did not care to pass this in they did not need to. To take one section as an example—that already represented in Table I, fourteen responded. One was absent and one of the others was judged by her mates to be

at the foot of the list and the third one very near it. The correlation between the self-made estimates and the estimates made by the others was by the Pearson rank correlation formula (used throughout this investigation,)+.96. This is as high a correlation as any of the individual correlations shown in the lower line of Table I. It would seem that individuals are able to judge themselves as well as others are able to judge them.

Table II is a similar table giving the judgments of the teachers. It will be noticed that while the average positions are not far away from the average positions in Table I (a correlation of .84), the probable errors are much greater. This is to be accounted for by the fact that the teachers are with the pupils less than one-sixth of the time that the pupils spend with one another, that probably the pupils are more keenly alive to a moderately bright hit made by a fellow pupil in the game of class work than are the teachers, and finally that the teacher looks at the pupil from a special point of view conditioned by the subject taught, while the pupils see one another in all subjects as well as outside of class. Because the pupils' judgments are a better index of general, as distinguished from special intelligence, these have been followed rather than the teachers' judgments in the final correlations.

The correlations of individual teachers with the teachers' average list show a considerable range, and the average of all comes no higher than .65. This may very well be due to the subject rather than to any marked difference in excellence of judgment. To throw some light on this, the teacher represented by W in this table was asked, and was kind enough to take the trouble to see, what kind of a list she could make with the sections she did not teach, but where she had a ten minutes' interview with each pupil separately. As a result of this her correlation with the average judgment of the pupils was +.54, while in the class she taught given in Table I, her correlation with the pupils' judgments was +.39. It is interesting to note that the average correlation of the teachers' judgments with one another is not far from that already found by Waite (in Pearson's magazine Biometrika, Vol VIII, p 92), who reports a correlation of +.50 for two different teach-

ers in the high school and +.66 for two judgments of the same teacher made nine months apart.

As to the value of the average position found in either table it would seem that the probable error of the average is too fine a measure to indicate certainty of position. The deviations are not due to chance to any extent, but to the ability and to the opportunity to appreciate different sides of a given personality. The probable error of the individual judgments (representing almost the majority of the judgments) is probably a safer guide to follow as to the certainty of the positions. In Table I the range of the individual probable errors would not place the most of pupils more than one place and a half (av, = 1.52) above or below the position shown by the average of all.

It will be noticed that the correlations of the brightest pupils with the class average are higher than are those of the less bright. It would seem that if an election could succeed in selecting the brightest, the opinion of all could be approximated closely enough for practical purposes, and this would afford an interesting comment on representative government. To see what results an election would give, three of the sections were asked to name by ballot a committee of three whom they could best trust to judge as to the ability of the other pupils. In one section the highest vote fell upon the same three persons previously selected as brightest, in another section they were numbers, 1, 3 and 4—in the third section numbers, 2, 5, and 9.

As already indicated it is not claimed that the average position shown in these tables is a complete measure of general intelligence. The experiences on which the estimates are based are too special. Some pupils probably give a better impression of their brightness than others, not because they are really brighter, but because they take the trouble required, or because they have natural social advantages. There may also be a great deal of special brightness in a particular line, either in the subject of study or in the wit and humor of daily contact outside of the class which, although recognized by the observers, is balanced off in their estimates by the lack of brightness or production observed in other lines. In real

life, however, or life outside of the school, specialization begins to count and a natural humorist, for example, may get a great reputation who would have little facility for the all round activities of the school. The term "general intelligence" or "brightness" in this investigation was always interpreted by the observers to mean the quality of the average intellectual output in all directions coming under their notice. There may very likely be directions in which those standing at the head of the list would show a great deal of facility and vice versa for those at the foot. Admitting, however, these restrictions it must be recognized that the lists show something—and that this is along the line of intelligence. What we prefer to call this is "school brightness" or more closely the brightness required in this particular school.

The problem then arises as to what are the essential features of this ability and whether there are individuals who have about the same intellectual capacities as those at the top, but who do not use them in the life of the school. Tests which correlate to a high degree with the judgments obtained would contribute to the solution of both of these problems. If the mass of the pupils have about the same position in the test that they have in the judgments, it is evident that these tests will serve to analyze the abilities involved, while those who are exceptional and who stand much higher in the tests than the position given them by the average of judgment can be regarded with some degree of probability as having a considerable part of the same ability which those have who stand higher than they in the judgment-lists. This fact, if known to them, may become useful in encouraging them either to make more effort or to find and remove some habit or timidity which stands in the way of their recognized success.

The tests that were tried out in comparison with these estimates were, rote memory, progress in reading upside down for ten minutes a day for ten days, tone discrimination, acquisition of ideas in reading from the printed page, retention of ideas for a week, range of information, two completion tests, and quickness in crossing out a's and t's. Rote Memory and reading upside down were found to have practically no correlation with the estimates or judgments. Tone dis-

crimination had a considerable correlation in some sections but very low in others. These tests were set aside and the remainder of the tests of the above test were taken to form an average. The records in each test were arranged in a frequency table and the percentage standing in the table taken as the final record.

	U	V	W	X	Y	Z	Total.	Av.	P. E.	Position.
A	1	15	14	3	4½	3	40.5	6.5	4.3	6
B	5	3	4	5½	9	6	32.5	5.4	1.2	4
C	9	1	5	12½	1	3	31.5	5.2	2.9	3
D	7	3	6	3	4½	7	30.5	5.0	1.3	2
E	2	12½	9	3	9	3	38.5	6.4	3.1	6
F	4	5	1	7½	13	15	38.5	6.4	2.6	6
G	3	12½	2	1	9	1	28.5	4.7	3.3	1
H	11	12½	8	5½	4½	9½	46.5	7.0	3.7	8
I	6	3	16	7½	13	15	60.5	10.0	3.8	11
J	10	7	10	9	4½	9½	51	8.5	1.9	9
K	13	16½	15	12½	15	11	83	13.8	2.4	16
L	12	16½	13	12½	2	13½	69.5	11.0	2.7	13
M	14	9	7	12½	13	9½	65	10.8	1.9	12
N	15	6	3	12½	7	12	55.5	9.2	3.3	10
O	8	12½	17	12½	15	16	81	13.5	2.1	14½
P	16	9	12	16	15	13½	81.5	13.6	2.9	14½
Q	17	9	11	17	17	17	88	14.6	2.6	17
r =	.71	.41	.55	.81	.60	.86	Av. r = .65			

TABLE II—The columns under U, V, W, X, Y, Z are the teachers estimates, of the same individuals as in Table I.

The test for acquisition of ideas was the reading of the paragraph supplied by Stoelting Co. called the Old Dutch Homestead. This was reproduced on paper immediately after reading or studying for three minutes. Ninety-seven pupils took this test. It contains 91 ideas or details. The average performance was 49.5 ideas with an A. D. of 9.2. The test for retention was the same paragraph, and there was no expectation on the part of the pupils that they would be asked to reproduce it a second time, and precautions were taken to ensure and to verify this absence of expectation. Four sections or 66 pupils gave an average of 43 ideas with an A. D. of 8.5. One section of 16 pupils gave the second reproduction ten days after the first learning, and had an average of 42 ideas with an A. D. of 9, practically the same as for the ten day period. One other section of 16 pupils did not give the second reproduction until the end of three weeks. In this case the average was 36, A. D. 6.6.

The test for range of information used was Whipple's list

of 100 words (published by Stoelting). The number of words defined was the standard taken. These definitions were written out by the pupils, who were told and made to understand by illustrations that they must define the word by putting what it represented in its class and distinguishing it from any other object in that class. All the definitions were gone over by the present writer and those not meeting this criterion were excluded. This treatment gave, with 98 pupils, a skew curve of distribution with the mode at 10 (correct definitions) and the average at 12. The A. D. was 3.

In the crossing out of a's and t's the pupils worked each with the same copy of editorial material in a newspaper for 9 minutes. The time was taken to find the time of simple reaction involved in this work by making similar strokes on a piece of paper, and the time per stroke calculated. This was subtracted from the total and the differences taken as the time of perception for a's and t's. The average of this time of perception for 92 pupils was 1.09 secs., A. D. .17 secs.

The two completion tests used were "Where the dandelions went" and "The strength of the Eagle," blanks supplied by Stoelting Co., Chicago. The two completion tests were added separately into the average (thus loading the value for this test).

The completion test thus forms the principal member of the series, and the correlation with the estimates was higher here than in the case of the other tests. This was due partly to an improved method of scoring. As everyone knows, one of the difficulties of the completion test is the fact that the gaps are usually counted as equal in value, while the fact is that they present a considerable range in difficulty. The procedure adopted was to count only those difficulties which on reading the papers had given some one of the 96 pupils an opportunity to commit some stupidity. The variations in filling in, which still made sense and were not contradictory to previous parts of the passage, were not scored as wrong. Those gaps which, say 50% of the pupils had failed to negotiate, were scored as twice as difficult as those which only 25% of the pupils failed to pass, and so on with the rest of the gaps. It was found that this method of scoring, as com-

pared with scoring equally every gap filled, raised the correlations between the completion tests and the estimates of the pupils from +.45 to +.56.

The accompanying chart shows in one section the comparative standing of each pupil in the estimates of her classmates and in the test. The black columns indicate the estimates, the shaded columns the tests. The correlation in this section between the two is +.83.

In the section whose table is given on page — the correlation is +.75. These correlations are so high that they could be slipped in among the correlations of judgments with the average (given along the lower line in Table I), and although not as high as those of the best judges, they are better than those of the worst. The other sections had average correlations of +.79, +.74, +.61, +.49. These with the two already given (+.83, +.75) give an average of +.70 for the whole of the 86 pupils who had missed none of the tests. A general view of this is shown in the accompanying correlation table (Table IV) in making which there has been made a correction for the range in the tests (shaded column) by taking the highest as 85% and the lowest as 15%. The Pearson correlation calculated from this table is +.74 which is quite close to the average of the correlations of the six sections made by the Pearson rank method.

The results of the tests show that they would be able to prophesy with a high degree of approximation when these pupils entered the school (if the tests were applied then) just what their fellow pupils and teachers would think of them as far as brightness is concerned, six months afterwards.

The question as to why the combination of a couple of completion tests, a test for range of information, one for acquisition of ideas by reading, one for retention, and one for quickness should give such a high correlation with the estimates made, is one which goes back to the kind of work done in the school. The completion test, if not a test for general intelligence in all walks in life, as Ebbinghaus thought, is one which parallels pretty closely what happens in the most of the recitations in this school, and in most of the schools with which I am familiar. The teacher proceeds by making state-

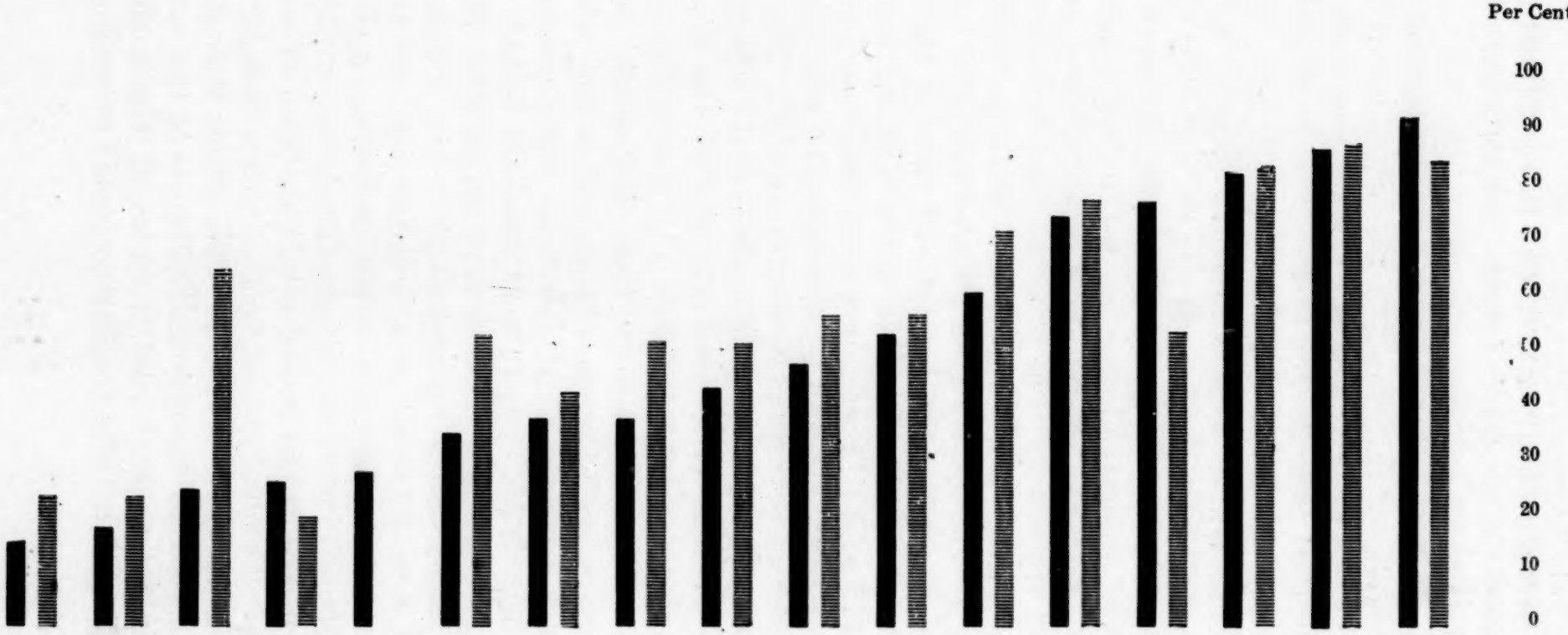

TABLE III—The black columns represent pupils estimate of intelligence, the shaded lines represent the tests. Pearson com., r = +.83.

ments, then stopping and calling on pupils, frequently volunteers, to fill in by further statements what has been said. This may be in the form of questions involving not what has

Pupils Judgements.

Tests.	+4	+3	+2	+1	0	−1	−2	−3	−4	−5	−6	
+4	5	2										7
+3		1	1	1	1							4
+2	2		3		2							7
+1	2	2	5	2	6		3		1			21
0		2	1		1	2	1	1			1	9
−1			1	1		4	3	1	3			13
−2				1				2	1	1		5
−3			1			3	1	1		1		7
−4					1			2		1	1	5
−5					1		1		2	1	1	6
−6									1		1	2
	9	7	12	5	12	9	9	7	8	4	4	86

r = .74. P. E., .039.

TABLE IV.

been learned but what will require some general knowledge and ingenuity in filling in. This is held to stimulate thinking, and there seems to be little doubt that it does stimulate a certain kind of thinking, principally of a rapid reproductive character. The question remains open, however, whether there is not thinking perhaps of a more independent kind, which is not favored by this usual school practice. Deep and individual thoughts are more likely to come slowly and after meditative seclusion and to require nursing for some time, while thoughts which have a purpose other than that of displaying the brilliancy of the pupil, and aiding in his standing, and which may be devoted to really benefitting other pupils in the class, are not likely to be prominent in the ingenious, the quick and sometimes risky responses of the usual "filling in" procedure.

The other tests used simply followed up this prevalent school practice. That is obvious in the case of quickness, and almost equally so in quickness of acquisition by reading. The

range of information shows probably also a tendency to take a real interest in knowledge, since a great many of the words in the test which the pupils were able to define were from their high school course. Some pupils were able to define as many as 25 to 30 of these words while others sank as low as 4 to 7. The value of the test for retention does not need to be dwelt on. Some part of the class work usually calls for retention, either of matter read or of material previously dealt with in the class.

The value of these tests for the individual teacher, apart from their value as an indication of the kind of work done in the school as a whole, would seem to be that a means is afforded, at the beginning of the school year, of getting a fair approximation of the results of future experience. In the cases of those who stood high in the tests, but low or medium in the estimates, as a result of interviews and special observations of them, as well as from their own statements, the present writer is decidedly of the opinion that they have much more power to succeed in the class work than they show. Sometimes this holding back was due, according to the persons themselves, to laziness, sometimes to timidity, and sometimes to a strong disgust for the whole business of the struggle for marks. Other elements of character doubtless enter in, such as procrastination, and sometimes there may be an element of special interest in and facility in the tests themselves. With these sources of error in mind, however, it would seem that by means of such tests the teacher is placed in the position of distinct advantage in getting more quickly to understand the nature and capacity of his pupil.

EXPERIMENTAL RESEARCHES ON LEARNING TO SPELL. I.

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I. The Teachers' Attitude towards Spelling.

There is probably no teacher of ripe experience who believes that children will absorb spelling without direct learning; though the case for unconscious absorption, practised under certain conditions, is probably not so weak as many teachers think. But they turn a deaf ear when one tries to induce them to give unconscious absorption a trial. "What," they say, "and ruin the spelling of the class all through its school career!"

The case is far otherwise when one speaks of the teaching of spellings and the different ways of learning them. Eagerness and critical attention take the place of contemptuous denial, and there is no lack of willing coadjutors when one proposes some experiments on different methods of directly learning to spell. For teachers, one and all, want the spelling of their pupils to be fairly accurate, one and all they want to achieve this result in as little time to the children and with as little labour to themselves as possible (an ideal I heartily commend, for a teacher's energies should not mainly be expended on routine duties). And nearly all of them say that the spelling of their pupils is bad. Their dissatisfaction with the present spelling is partly a consequence of an ideal of spelling in elementary schools which was pitched too high; for the polysyllabic generalities of leader-writers were once the tests of reading and spelling in these schools.[1] That day has gone by but its influence lingers. Still, even allowing a fair discount, here and there, for a standard pitched too high, there

[1]See W. H. Winch, *Problems of Education*, page 128. Sonnenschein. 1900.

must be granted a considerable justification for the teachers' complaint. To me it has always seemed somewhat of an absurdity to teach spelling by dictation, as most of us do today. Dictation is one useful form of determining whether spellings, supposed to have been learned, have actually been acquired; but how it teaches spellings, except in as much as every effort to express them clears up our percepts, I fail to understand. Transcription is still more of a broken reed. Little children have no great objection to copying words and sentences: on the contrary they like it; but they will, if undirected, copy letter by letter (I *have* seen a child copy *the parts* of a letter separately, looking up at the black-board for each stroke); and they will *not* be found, when all the copying is done, to have acquired much correct orthography.

A useful variant in the practice of transcription is to allow a certain time for exposure and then to cover up the word or phrase, leaving the children to copy it from memory. Children find this a most interesting exercise, and will learn a considerable amount of correct spelling in this way. Of course it needs some supervision, and, if the acquisition of accurate spelling is the object, is probably not the best method. Still it is a good one, and at once reminds the teacher, if he knows anything of experimental psychology, of those memory experiments, in which, after looking at something for so many seconds, he is required afterwards to write down what he has seen. It is, indeed, an exercise in visual memory.[2] Then the teacher, with some modern knowledge of educational theory, is apt to remember more about his psychology and to ask questions about visual memory and auditory memory; and, if he be very modern, about motor memory. Then he remembers that he has been recommended to use combinations of these memories, since combinations are said to be better than single memories. One teacher I found calling out words, letter by letter, whilst his boys were learning them visually, letter by letter, from the black-board. He was going slow and the boys were going fast, so at first, he muddled them a good deal; but I

[2]As the method of apprehension may *not* be the method of retention—sounds, for example, may be translated visually and remembered that way—it would be more correct to say the memory from visual perception.

noticed that most of the boys soon ceased bothering with teacher: they 'inhibited' his contribution, and came through quite well. The teacher attributed their success to the combined auditory and visual method. It was, of course, for most of the boys, a visual method with an inhibited auditory stimulus, and in no sense whatever a combined method. But let us look a little further into the psychological issues.

II. The General Results of Psychological Experiment.

This is not the occasion on which to enter into a protracted discussion as to the varied experimental findings of the psychologists who have investigated these questions. A brief aperçu is all that I can hope to give. First of all I purposely omit all reference to experiments on adults. Children and adolescents, we are quite sure, are unlike adults physically and morally, and it is quite time that we realized that they are also unlike them intellectually. To this fact child-study societies owe their stimulus, their justification, and their future. To this fact also the educational psychologist owes the special material of his science.

But even if we eliminate the adult we can but say that psychological experiment, so far, speaks with an uncertain voice. W. A. Lay,[3] from the results of experimental work with children, came to the conclusion that motor memories, whether articulatory or graphic (tracing the words in the air), acting in combination with other memories, gave better results than those memories (visual and auditory) when acting alone.

Smedley[4] found that, generally speaking, combined memories were better than single ones, though he also found that *tracing* numbers on paper whilst learning them was a disadvantage.

Pohlman[5] showed that, with *some kinds of material,* auditory memory was best at first, but that the visual memory improved with age, and finally became the best for *all material.* Auditory plus visual apprehension was generally better than

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[3] *Experimentelle Didaktik,* 3rd Ed. 1910, pp. 297-305; 351-370.

[4] Report of the Department of Child-Study and Pedagogic Investigation, Chicago. 1900-1901.

[5] *Experimentelle Beiträge zur Lehre vom Gedachtnis,* 1905.

auditory by itself. The addition of a motor factor, he found, lowered the result.

Though there appears a balance of experimental justification in favour of combined memories, there *are* researches which indicate the superiority of a single mode of apprehension, and all readers of pedagogy will know of Meumann's sustained argument against what he believes to be the spurious motor factor of Lay. I have myself[6] tried to contribute something experimentally to the discussion, showing the condition under which the motor factor is helpful, and also, with the same children, the conditions under which it is not. And there is much more work on the lines of the above researches awaiting compilation. But for the present I am disposed to present the problem in a form in which it will be more intelligible to teachers than if I were to use nonsense syllables or unassociated letters or numbers. I propose to use actual words which children will need to know.

III. General Plan of These Experiments.

If we are to use actual words the great problem is, of course, to find lists of words of equal difficulty; for they may be suitable for one class and not for another, even of children of the same 'standard' or 'grade.'

Let us make an attempt to pick out two lists of words of equal difficulty for a given class. Then let us test our selected lists by setting the spellings to be done. The average results from the two sets should be practically identical, and the coefficient of correlation between the two series should be very high. That will mean that any boy, say Alfred J——, for example, does about as well or badly, compared with the other boys, in the one list of words as in the other. We have now, we will suppose, obtained two lists of words of equal difficulty. Next comes the practice period. For several days or weeks, as the case may be (it is always unsafe to trust to single practice exercises), let one set of words be taught or learnt in one way and the other set of words in another way, the lessons

[6] W. H. Winch, *A Motor Factor in Perception and Memory.* Journal of Experimental Pedagogy. June, 1912.

being so arranged in time and sequence that one set of words has no advantage over the other in the general conditions under which it is studied. Then, after an interval, let us test the results of both methods. Which set of words is known the best? The averages of the two lists are, of course, the determining figures. But it is unsafe to draw any conclusions at all without a close correspondence, all along the line, between the results from the one list and the results from the other, unless, of course, there is an enormous difference between the averages.[7] The positive correlation should be high. And if it is, a very small difference between the averages will be significant, that is, will give us ground for valid inference.[8] These general descriptions of method will probably become plainer to those who have never tried for themselves when I pass to the details of the experiment.

IV. A First Experiment with Standard II. Boys.

Average Age 8 years 9 months.

i. *The Boys who did the Work.*

First of all, what sort of a school was it in which the experiment was carried out and what kind of boys were they who did the work? These are preliminary questions which everyone who experiments with school-children should be prepared to answer. Many apparently contradictory results fall into line and become intelligible when these facts are understood. This school was a municipal elementary school for boys situated in a poor neighbourhood in the East-end of London, attended exclusively by the children of Jewish aliens. It was a small school, not considered of high pedagogical proficiency, but rapidly improving. The mental level of the boys was well known to me from a series of mental tests that had been administered throughout the school. There were practically no 'defectives', and very few boys who would technically be called

[7] An enormous difference would, however, really convince an experienced experimenter with children, that he had muddled the thing somehow.

[8] I have set this out clearly by means of simple examples in a Statistical Preface to my *Inductive versus Deductive Methods*. Warwick & York, Baltimore, U. S. A. 1913.

'backward'; still the level of ability was not high. In rapidity and accuracy of numerical calculation the boys had shown to advantage, but in several other respects had fallen below, rather than above, English school children of a corresponding social class. They were rapid and proficient in the acquisition of English, and they were ahead of English boys in linguistic *fluency;* their inadequacies, contrary to what one might have expected, were not predominantly linguisitic. They were supposed to spell badly; but that is a common complaint in schools: I am not aware that it had any special justification. I now proceed to the details of the first experiment.

ii. *The Lists of Words of Equal Difficulty.*

I need, perhaps, hardly say that words must be chosen of which no boy can spell the whole, and with which most of the boys can accomplish something. So, this being a Standard II class, we selected the words from a reading book used by the class above, namely, Standard III. The following were the words picked out:

The List of Words called Set A.		*The List of Words called Set B.*	
opposite	quarrel	secretly	nostrils
pleasant	astonish	ancient	dwarf
precious	guard	breadth	listen
ceilings	oysters	umbrella	silence
neighbour	elephant	surprised	leopard
splendid	companion	foreign	special
fault	believed	receive	guessed
measure	whispered	circle	future
question	lazily	poisonous	officer
grieved	parlour	unknown	tasteless
telegraph	accidents	quarter	biscuit
valuable	enough	crutches	scented
sovereign	machine	rascal	juices
shrieked	miserable	rough	yawn
sleeve	noticed	holiday	jealous.

iii. *How the Test Words were Administered.*

They were called out by the experimenter, each word once, and then written down, one by one, in small hand, by all the boys taking part in the experiment. The words of Set A were called out first and then the words of Set B. This was an error in procedure. It had been arranged that the words

from Set A and Set B should be called out alternately, one from Set A and then one from Set B, and so on. But this was not done. Hence a fatigue factor *may* have lowered the number of correct spellings for Set B. In result the words of Set A and Set B were equally well done; but if a fatigue factor did operate, that would mean that Set B is really slightly better known than Set A, and is, therefore, easier for this class. This must be borne in mind when conclusions are drawn from the results.

The actual averages, correlation-coefficients between the results of the two sets and the 'probable errors' of their difference will be shown later on. For the present it is asked that it may be granted that for these boys the words of Set A and of Set B are of equal difficulty.

The Preliminary Test was given on Friday, January 31st, 1913.

Chronology of the Teaching Practice for Set A and Set B.

On the following Monday morning the practice series began with Set A at 9.45 a. m., a lesson lasting exactly 10 minutes, following a Scripture lesson. At 2.05, on Monday afternoon, immediately after assembly, the practice series began with the words of Set B, a lesson again lasting exactly 10 minutes. On Tuesday morning at 9.45 a. m. the second practice period of 10 minutes was taken with Set B, and in the afternoon at 2.05, the second practice period of 10 minutes with Set A. A third and fourth period of the same length and corresponding times was given to Set A on Wednesday morning and on Thursday afternoon, whilst a third and fourth practice period of 10 minutes each at corresponding times was given to the words of Set B on Wednesday afternoon and on Thursday morning. These alternations from morning to afternoon were made, of course, so that neither list should suffer any advantage or disadvantage of time or placing in the school curriculum.

v. *How Each Test was Learnt in the Practice Series.*

The words of Set A were shown on a black-board, and the Head Master, a man much practised in experimental work,

spelt each word carefully, with slight pauses between the syllables (though these were not pronounced) and a clear distinct pronunciation of each word after spelling. Then the boys, simultaneously, word by word, after the experimenter, in an audible voice, looking at each letter as they named it, spelt each word twice. This took 9 minutes. The remaining minute was given to a second spelling of the words near the middle of the list.

The words of Set B were learned in another way. The Head Master read the list through, carefully pronouncing each word, and the boys were told to learn the words silently by looking at them. It was intended that there should be no audible articulation of the letters; but, in practice, every boy did, as teachers say, 'mutter the letters and words to himself.'

vi. *The Analysis of the Two Methods.*

The method adopted for Set A was a visual, motor-articulatory, and auditory method, with attention directed throughout by the experimenter. The method adopted for Set B was a visual method with much less contribution (if they do contribute) from articulatory and auditory factors. The attention of the children, after the preliminary reading by the experimenter, was *not* directed; but they appeared to be working all the time. They appeared to be working fast, and they undoubtedly made more visual repetitions in the given time than they did with the words of Set A. Here, then, we have two school-methods in actual practice (for the methods were not invented for the purpose of this experiment) subjected to an exact experimental verification, the one a combined simultaneous method with directed attention, the other predominantly visual, each boy working by himself.

vii. *The Final Tests with Set A and Set B.*

On the following Monday, after a three days interval, the work was tested by the dictation of the lists at 9.45 a. m., one word being dictated from Set A, then one from Set B, and so on. The results are shown in the tables subjoined.

viii. *The Results of the Preliminary and the Final Tests.*

By the preliminary test I mean that which was given before learning, to show how far the selected lists of words, Set A and Set B, were of equal difficulty for these children. By the final test I mean the test which was given after the practice periods, the words of Set A having been learnt in one way and those of Set B in another.

I shall show how the individual results are tabulated, since it may help teachers who desire to repeat the experiment.

Table I, showing how the Results of each boy's work were tabulated.

Name.	Test before learning. Number correct out of 30 words of Set A.	30 words of Set B.	Test after learning. Number correct out of 30 words of Set A.	30 words of Set B.
S. Dorin.	27	24	30	30
B. Baron.	21	21	30	29
I. Warchauski.	16	18	29	29
H. Gencherousky.	13	13	29	28
. . . . .	..	..	..	..
L. Gluckstein.	7	4	26	14
. . . . .	..	..	..	..
S. Warchauski.	6	10	19	18
M. Preskov	5	4	14	10
S. Alexander.	5	6	27	19
. . . . .	..	..	..	..
M. Berman.	2	4	25	22
I. Cohen.	2	0	14	11
. . . . .	..	..	..	..
T. Levy.	0	0	1	1
53 boys, Averages.	5.5	5.7	17.6	15.8

Comments on Table I.

It certainly looks as if the two lists of words were well chosen, for they are equally well done at the start: it also appears that the method by which Set A was learnt is superior to that by which Set B was learnt. It seems also, and this we must not forget, that they were *both* good methods, for an enormous improvement has been shown in both cases, an improvement due to 40 minutes practice for each set, spread out over 4 days. The final test was given, it will be remembered, after 3 days interval, and on Monday morning—a bad time pedagogically. But of course, the difference in the average results of the two methods, 17.6—15.8, *might not indicate any-*

thing at all of a general nature. The method for Set A might be better for good boys, and the method of Set B for weaker boys or vice versa. Even a big difference between the averages might not really indicate anything about our methods; it might even be due to variations which, as we do not understand them, we call 'chance' variations. How then can we show that our differences are differences all along the line and so possess logical significance? One such way, easily understandable by those who have no special statistical knowledge, is by means of the following—a grouped correlation table.

Table II, showing, section by section, the Number of Words Spelt Correctly before and after Learning.

Number of words of Set A correct before learning.	No. of boys.	Before learning. Av. No. right in Set A.	Before learning. Av. No. right in Set B.	After learning. Av. No. right in Set A.	After learning. Av. No. right in Set B.
14 to 27.....	3	21.3	21.0	29.7	29.3
11, 12, 13.....	5	12.2	12.2	26.6	25.6
8, 9, 10.....	6	8.9	10.7	25.2	23.3
6, 7.....	8	6.6	6.8	22.9	21.2
5, 4.....	7	4.9	4.0	18.7	12.3
3, 2.....	12	2.2	2.0	15.1	13.5
1, 0.....	12	0.2	0.8	5.5	5.3

Comments on Table II.

The regularities of this table are quite beyond the realm of 'chance,' and show a clear victory for the method employed for Set A all along the line. The teacher who repeats this experiment should now turn to his list of individual results; he will probably find eight or nine per cent. of the boys who do better with the method employed for Set B; but he must not assume, without further experiment, that that is because the B method is better, even for them. It *may* be so, but the only clear and certain thing is the superiority of the A method for the class generally. If a fatigue factor operated in the preliminary work with Set B, the conclusion is strengthened.

ix. *Statistical Evaluation of the Results.*

It is useful, most useful, to have the results of all experiments drawn out for each child individually as in Table I. If they are 'jumpy' they may as well be thrown away. But if they are regular, it is useful to make sectionized tables of correlation as in Table II. This shows us not only the *reliability*

of our results, but also—a most important issue to teachers—whether strong and weak pupils are affected in the same manner. But a third and much shorter way may be adopted of showing the validity of the conclusions. *After* the individual schedules, and *after* the tables of grouped results, a more precise evaluation may be adopted. For this we need to know averages, correlation-coefficients and 'probable errors'. The correlation-coefficients have been worked out from the individual cases by the Pearson formula $r = \frac{\Sigma\ xy}{n\sigma,\ \sigma_2}$, and the 'probable errors' of the differences between the averages from the formula 'p. e.' $= .67449 \sqrt{\frac{\sigma_1^2+\sigma_2^2-2+\sigma_1\ \sigma_2}{n}}$, the usually accepted formula of statisticians.

Before learning, the results for Set A averaged 5.5, those for Set B averaged 5.7. The correlation-coefficient between the A list and the B list is +.93. The difference between the averages is .2 and the 'probable error' of this difference is .19. This means a practical identity of difficulty between the two lists as far as these boys are concerned. After learning, the results for Set A average 17.6, and for Set B average 15.8. The correlation-coefficient between the results for Set A and Set B is +.90. The difference between the averages is 1.8 and the 'probable error' of that difference is .36. Thus the difference between the averages is 5 times its 'probable error', a most conclusive verification of the significance of our results.

This section is inserted for the use of experimenters; it is not intelligible, as it stands, to those who have made no study whatever of statistical methodology.

x. *Conclusions from the First Experiment.*

I shall begin by saying what is *not* proved; for nothing is more disappointing to an experimenter than to find his results misinterpreted. An experiment in educational psychology is generally directed to a particular issue, it is not usually (though it sometimes is) susceptible of complete adoption as a method of teaching. And in this case I should be sorry to find teachers picking out lists of words, thirty at a time, and

without any reference to their meanings, or to their applicability in a context, or to a graded system of learning reading within which they should occur, setting their boys to learn them. And I want to emphasize the point that this experiment does not show that an incidental method of teaching spelling is wrong.[9] An experiment with groups of children, equal in their capacity to spell, could be arranged, given willing and scientific co-operation on the part of the teachers, so as to show whether a direct or an indirect method were the better. But teachers, as I have said, distrust the incidental method, and do not care to try it. Their reluctance might be partially removed if educational authorities and His Majesty's Inspectors of Schools would not count a failure against a teacher conducting an experiment, even if the experiment proved the method employed to be a bad one. Of course I mean *serious* experiments, where every proper precaution is taken and every result kept and tabulated for every child, with a complete chronology of the teaching and testing. There is little value in mere hap-hazard trials. I have not the slightest doubt of the sympathy of His Majesty's Inspectors; they have shown it so many times to my own students; but all local authorities are not equally enlightened. However, we may still hope. Let us then set aside the incidental method for the present. What have we proved? We have proved for boys of Standard II in a school very poorly situated 'down East' in London that, when they are set to acquire the correct spelling of words, they learn them more readily by a method in which their attention is directed by the teacher, letter by letter, and when there are marked motor-articulatory and auditory factors as well as visual ones, than they do by a method in which they learn visually and more or less silently by themselves. But both these methods have been shown to be good.

How far can we generalize these results? Before presenting further experiments let me suggest one or two important considerations. These are *young* children and they are *not of the highest type* of elementary school children. Will not

[9] See WALLIN'S *Spelling Efficiency*. (Warwick & York, Baltimore, 1911,) for a discussion of the incidental and direct methods.

motor and auditory factors, therefore, affect them in a way in which less primitive children will not be affected? It *may* be so; let us keep the possibility in mind. A further possibility: these boys, though they worked hard enough at these spellings, had not been accustomed in this school generally to work much by themselves visually and without articulation—at least, not with much profit. Have we tested merely a failure of their habitual school practices? To settle this we might try some experiments more strictly psychological, such as I may present later on. And we might make the same experiments in other schools well-situated, with English children, and with older children, girls as well as boys.

For the present what *is* proved is the superiority of a more combined method, the first with attention directed by the teacher, letter by letter, the second not, when the mental ability of those using the method is low and undeveloped. Further experiments may clear up our outstanding possibilities one by one.

(Concluded in the December number.)

MENTAL AGE TESTS.

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The tests discussed below are a part of those described in Dr. Squire's articles in The Journal of Educational Psychology in September, October and November, 1912. Some of them were given in the same form as there outlined and some were modified, and in arranging for them Dr. Squire's helpful suggestions were of great value. The work was done by the writer as he found time, with a limited amount of assistance from one efficient helper. In order to do as much as possible in a limited time, some of the tests were arranged and given by classes. Only one of those used was modified in any other way. The children are of English and French-Canadian descent, taken without selection, and there was no elimination of records in making the averages except in a very few cases where the knowledge of English was too small to make the answers of value. The tests were given in February and March, 1913, and in reckoning averages for each year, all children were counted whose age was within six months of the year under consideration on March 1.

The papers for the "a" test for perception and concentration were prepared on the Neostyle, and consisted first of 100 a's in groups of five, a second part of 100 a's distributed ten to a line in short nonsense syllables, and a third part like the second, but with a different arrangement of syllables. This test was given by classes, 30 or 60 seconds being allowed for the first, according to grade, and 60 seconds for each of the other parts. While the third part was being done by the children, a paragraph from a lively bear story was read by the examiner. The time needed for crossing out 100 a's was cal-

culated in each case, and the difference between the time of the first part and each of the others was taken as the measure of perception and concentration, respectively. The following table shows average results:

"A" TEST.

Age	7	8	9	10	11	12	13	14
Number tested	38	48	53	65	48	53	69	48
Av. Motor Time, sec.	96	92	71	66	62	52	49	47
Motor Percep. Time	207	186	158	142	126	111	101	98
Perception Time	111	94	87	76	64	59	52	51
Av. Deviation	26	29	30	25	18	13	12	9
Av. Errors in Percep.	2.9	1.6	1.5	1.3	1.3	1.4	1.3	.8
Av. Dev.	3.4	1.6	1.4	1.3	1.2	1.2	1.2	.9
Motor Concen. Time	175	156	134	120	112	99	91	88
Concentration Time	79	64	63	54	50	47	42	41
Av. Dev.	22	22	19	15	13	14	11	11
Av. Errors in Concen.	.9	.8	.5	.6	1.3	1.3	.9	.9
Av. Dev.	.8	1.0	.8	.9	1.1	1.1	.8	1.1
Failures	9	9	2	1	4	1		

The time required decreases quite regularly with increasing age, and the average deviation does not seem unreasonably large. The third part of the paper was almost without exception done more rapidly and more accurately than the second. This is referred to here as a test in measuring ability to concentrate attention, because it is so suggested in Dr. Squire's article, the idea evidently being that the reading of the story would so distract attention that work in the third part of the paper would require more time than in the second, and that concentration time, minus perception time, would be a measure of each child's power to control his attention. As a matter of fact, the reading acted as a stimulus to rapid action, and so probably would any reading that was lively enough to attract the children's attention. Questioning showed that the children had pretty generally noted the principal points of the story. Doubtless the skill acquired in doing the second part tended to increase speed in the third, and also the accuracy, as shown by the number of errors. For some reason this improvement in accuracy was much greater in the younger half of the children. Missing an "a" and crossing out a wrong letter were each counted as error. The time element would seem capable of being made a suitable measure of mental growth in perception when correct standards can be established, but the errors do not vary much from year to year, and the average deviation is so great that this part of

the test cannot have much value in determining mental age, whatever value it may have in showing the type or quality of mind in the child tested.

For the comprehension test the following pictures were used: Sympathy by Riviere, The Singing Lesson by Wunsch, Composition Day by Geoffroy, The Children's Friend by Eberle, and Lost by Schenk. These were Perry pictures, about five by eight inches, each mounted on a card, and none colored. The name was blotted out and each child was asked to give a suitable name for each picture. This test was given individually. The answers were classed as showing complete comprehension, knowledge of principal object, action, description and enumeration, and were ranked in the order named. The average score was reckoned by giving to each kind of answer a number, 5, 4, 3, 2 and 1, respectively.

COMPREHENSION TEST.

Age	6	7	8	9	10	11	12	13	14
Comp. Comprehen., per cent	0	0	1	4	7	5	8	15	12
Prin. Object, per cent	0	1	1	4	5	5	10	11	19
Action, per cent	3	5	15	26	23	26	20	20	22
Description, per cent	7	20	24	32	49	41	50	43	37
Enumeration, per cent	90	74	59	34	16	23	12	11	10
Average Score	5.9	6.4	7.8	10.3	11.8	11.1	12.9	13.1	14.2
Av. Dev.	1.1	1.2	2.1	3.0	2.0	2.6	2.5	3.0	3.2
Number Tested	22	47	59	55	59	43	52	73	53

The results show a fairly regular increase in ability with a tendency to slower development at some period between the ages of 9 and 12. The averages are lower than those obtained by Dr. Squire, which may be accounted for in several ways. The method of determining the average for each age is different. In the present case half the children were younger than the age named, but none more than six months; in Dr. Squire's reckoning, none was younger than the year and none more than six months older. The children whose tests are recorded here are probably not so familiar with the study and interpretation of pictures, and the writer claims no skill as a judge in such a test. As a measure of the child's growing comprehension it seems valuable. The chief difficulty would seem to be to secure uniform judgment on the very various titles children can give.

The visual memory test was given by showing each child

separately a card about fifteen by eighteen inches having on it pictures of twenty common objects, namely: clock, book, watch, girl's head, shoe, man's head, bottle, glove, gun, hammer, house, dog, slipper, boy on sled, piano, knife, hat, engine, chair, collar. The exposure was for thirty seconds, and the child immediately named all the objects he could remember. For the auditory test the following series of sentences was constructed, each two syllables longer than the preceding.

1. Come in.
2. See the cat run.
3. Place the book on the chair.
4. The wolf came running through the fields.
5. The path of the moon lies across the sky.
6. I must have a boy to watch my sheep and cows.
7. As the light grew brighter she saw what had happened to him.
8. Then was seen the greatest fight that the sun had ever looked upon.
9. As the magician lay in a sleep a great serpent came softly from the woods.
10. The heavens have the summer all the year, but the earth shall have summer half the year.
11. Every day I will watch for you and every night I shall build a fire on the mountain top.
12. The warriors caught the younger boy up gently and carried him far away from his home and friends.
13. They were at the foot of the mountain, but the people no longer feared them, for now they were not men but rocks.
14. How can they know when it is night when they have no sun and no moon to tell them when it is day and when it is night?
15. The man gave the pearl to the king and then went home wishing that no one would ever talk to him again of his sense of smell.
16. Thunder and Lightning were talking about whom to invite and they questioned whether to ask the sun, the moon and the wind to come in.
17. The Indians can see a hare in the moon, and this is the story that they tell their children about it when the moon is shining at its full.
18. Far away in the forest there once lived the most cruel man in all the earth, who had often shot a rabbit and once or twice he had shot a man.
19. One day a hunter when on his way home heard a baby crying in one of the wigwams and he ran to it hastily to see what he could do for it.
20. For many days they traveled, and at last they came to a high mountain upon whose summit the sky seemed to rest, and when night came he put a great jar over the cat.
21. Some magicians are cruel, but others are gentle and good to all the creatures of the earth, and it was one of these who came into the house this morning when the sun shone.

These sentences proved to be not perfectly graded, Nos. 7 and 9 being more difficult proportionately than the others. One sentence after another was read, the child immediately repeating till a mistake was made.

MEMORY TEST.

Age	6	7	8	9	10	11	12	13	14
Number Tested	18	50	51	50	52	42	45	63	47
Av. Score Visual	5.3	6.1	6.0	7.3	7.5	7.5	8.4	9.2	10.
Av. Dev.	1.2	1.4	1.2	1.9	1.7	1.6	1.8	1.5	1.8
Av. Score Auditory	5.3	6.0	6.2	7.2	7.4	7.7	8.0	8.3	8.5
Av. Dev.	1.2	1.3	1.4	.9	1.1	1.3	1.1	1.2	1.2

The changes from year to year are not large, especially in the memory of sentences, but the progression is steady, and the periods of rapid change and comparative rest are quite plainly marked.

For testing learning power the Maltese cross test was used, and also a modified color and number test, both arranged to be given by classes. Four equilateral triangles were placed on a large card in form suggesting a Maltese cross and numbered from one to four. Groups of triangles in the same positions, but in different order and without numbers, were on the papers before the children. The large card was exposed for a brief time, perhaps five seconds, and the children asked to put the same figure in each triangle as appeared in the corresponding one on the large card. Most of the children under 11 had eight chances, those older only six.

MALTESE CROSS TEST.

Age	6	7	8	9	10	11	12	13	14
Number Tested	23	50	51	47	55	44	46	61	42
Failures	17	22	22	8	7	8	11	6	6
Av. Trials for Success	3.0	3.1	3.4	3.0	2.5	2.3	2.2	2.5	2.5
Av. Dev.	1.3	1.1	2.1	1.8	1.4	1.1	1.3	1.4	1.4

The results do not agree well with those obtained by Dr. Squire, and the slow change and wide deviation seem to indicate that it is not a very helpful test in determining mental age. The great drop in the number of failures between ages 8 and 9 is striking.

For the color and number test the two groups of three forms used by Dr. Squire were placed on a large card each filled with a different color and numbered below from one to six. On the children's papers were two rows of the same figures in different orders and without color or number. The large card was shown about five seconds, and the children asked to fill each form with the same color as appeared on the large card and put the same number under it. The same thing was repeated with the second row of forms. The first

trial was counted as a preparatory one, and the results of the second reckoned up.

COLOR AND NUMBER TEST.

Age	6	7	8	9	10	11	12	13	14
Number Tested	26	42	49	42	53	39	45	57	42
Av. Score Color	2.3	3.3	3.0	4.0	4.0	4.2	3.7	4.2	4.2
Av. Dev.	1.2	1.2	1.3	1.0	1.3	1.3	1.5	1.5	1.4
Av. Score Number	.6	1.2	1.4	1.7	2.1	2.2	2.3	3.2	3.0
Av. Dev.	1.0	1.0	1.2	1.2	1.6	1.7	1.6	1.5	1.6

The results, especially as to the number memory, are not very satisfactory, and the test could evidently be put in better form. This is the only test used which was changed in any way except as necessary in giving to classes instead of individuals. The implication one might derive from the color score, that children reach their maximum ability to learn at about 9, is something that must be considered as important if true, and is certainly worthy of further inquiry.

For an association test one set of twenty words was used, practically the second set in Dr. Squire's article. Each word was read to the child, and he was asked to give the opposite idea as quickly as possible. The time required, noted in this as in other tests by the use of a common watch with second hand, and the number of mistakes made were recorded. It was not possible to finish this test in the lower grades, so that the records are of little value below age 9.

Again the time shows steady gradation, but the errors seem to depend on some other characteristic of the mind than its increasing maturity.

ASSOCIATION TEST.

Age	7	8	9	10	11	12	13	14
Number Tested	7	19	46	50	41	44	58	49
Av. Score, sec.	118	118	108	101	98	82	79	71
Av. Dev.	17	17	23	20	21	20	21	16
Av. Errors	4.1	4.2	4.5	4.7	4.8	3.8	3.6	3.2
Av. Dev.	1.3	2.2	2.2	2.0	2.2	1.9	1.9	1.6

A comparison of individual records has been made to see if any relation would appear between the tendencies to error in the association and perception tests and the power of learning as shown by the Maltese cross test. Of all those who made two or less errors in the association test, 76% made only one error or none in the perception test and 47% did the Maltese

cross test in one or two trials. Of those who made five errors or more in the association test 42% made two or more in the perception test and 34% required four or more trials in the Maltese cross test or failed. The average number of errors in the association test for all children is between 4 and 5. All the children who made four or less errors in this test averaged 1.1 errors in the perception test. About one in six failed on the Maltese cross, and the rest required an average of 2.8 trials. All the children who made five or more errors in the association test averaged 2.2 errors in the perception test. One in four failed with the Maltese cross, and the rest required an average of only 2.2 trials to do it.

The study of these tests has proved very interesting, and even in this incomplete form gives results in individual cases quite in harmony with the observation of teachers and the evidence of school room work.

THE EDUCATION OF DEFECTIVES AND THE TRAINING OF TEACHERS FOR SPECIAL CLASSES.

E. B. HUEY,

Johns Hopkins University.

The Teacher's Qualifications.

Defectives in the schools should all be placed in special or ungraded classes with not more than 15 or 18 in a room. The selection of suitable persons to conduct such classes is a matter of the utmost importance, and there are two or three qualifications which can not be too much insisted upon.

(a) Teachers of special classes should have as a first requisite superior intelligence, originality, sprightliness of ideas, and live interest in social problems. Intelligence is imperative for they should be allowed to make their own course of study absolutely, and a different one for each pupil. Because of the superior ability which is required the salary should be about 25 per cent higher than that paid to the regular teachers.

(b) Experience in manual and industrial training, kindergarten, and the work of the first three or four grades, are the things which will help them most. Experience in social service work, whether as volunteer or settlement worker, charities agent or probation officer, is equally important with experience in teaching.

(c) The ability to do efficiently all the work of a household, including the care of children, cooking, cleaning, etc., I should place as the experience most necessary of all, an experience that ought to be acquired at once by the prospective class teacher in case she does not already possess it. These are the first things she will need to know.

(d) Some special training in the psychology and pedagogy of mental deficiency is also desirable, and this should include, where possible, actual class room work with defectives. The more theoretical part of this training is now offered in a number of universities, but the practical training needed is not offered except at a very few summer training schools, notably at Vineland, New Jersey, and at the University of Pennsylvania.

If the teacher can not get to either of these summer schools, she is at least as well off as I found the teachers of special classes in Chicago, and as well off as they are in most cities. Whether she is able to secure this training or not, the special class teacher should have the other qualifications mentioned. She should begin by brushing up her wits. Constant reading of such literature as "The Survey," "The Training School," etc., will help to get her informed and will encourage her by showing how her work is part of a great and very hopeful social movement. She will thus escape the discouragement which is so likely to result if she thinks only of the unsatisfactory progress of some of her pupils.

The Work of the Special Class.

The special class should receive all pupils who distinctly fail to make progress in the regular class or who seriously interfere with or fail to be amenable to the methods and work proper to the regular class. Two distinct kinds of pupils will thus be removed to special class. (a) There are pupils who get behind or in trouble, not because of arrested mentality, but from poor health, irregular attendance, defective vision or hearing or speech, unsuitable parental discipline, bad habits, bad company, or what not. They are retarded but not arrested; they may be very troublesome and bad, but they are not degenerate. They have the future of persons of normal intelligence; and though they need to be in a special class in order that they may have individual attention and at the same time relieve the regular class, their work should be along the lines of regular classes, with only more emphasis on the manual and motor, and they should eventually be made to regain a place in a regular class even though in a lower one.

(b) The second kind of special class pupils are those who are retarded, or unstable, not from some local cause or remedial circumstance of environment or discipline, but from deep-seated arrest of brain growth or perhaps from injury to or disease of the brain. If the brain arrest will not let their minds grow to a strength and efficiency beyond that of a child of twelve years we call them feeble-minded. If the arrest is not so severe as this, but is sufficient to keep them always as irresponsible mentally as boys and girls of the early teens, we call them mentally defective or neurotic, but not feeble-minded.

There is no cure for feeble-mindedness. Children who belong to this group will never do the work of the upper grades satisfactorily. When they learn at all it is by rote and parrot-like. Their work in life, from their permanent shortage of brains, will never be such as to call for the preparation given in the regular classes. Training in the proper care of their own person and clothes and instruction along the line of household duties, and the simplest kinds of self-supporting industrial work, together with habits of cleanliness, politeness, morality and helpful service should be the all in all of what the school attempts for them. These things really should be the foundation of all education; but defective children must get such training and get it well. Afterwards we may add a little of the book and number work if they seem to like it and if there is time for it.

The special class teacher should be set free from two woefully mistaken assumptions. One is that all children need to be taught the three R's. These children do not. They waste their time and lose their courage every day that they are kept at it. In the words of Superintendent Johnstone, "The feeble minded child needs of the three R's only enough to enable him to read the simplest things, to write his name and perhaps a simple letter, to count his money and perform the most elementary arithmetical combinations." There is no abstract book work that should be required of such a special class.

Another erroneous assumption is that the mere doing of certain exercises develop the brain, and that there is a limited list of exercises that will do this. It is not the mere doing, but the intent realized in the doing, that is mentally developing.

Mere doing will fix a habit, be it bad or good; but in this there is not necessarily a mental growth. Hammering and sawing, except as done to a purpose do not develop the brain of the feeble minded any more than the hoe developes brains in the "man with the hoe." Manual training teachers often suppose that there is disciplinary efficacy just in the tools and the wood and the hours of labor, and that only *certain* manual exercises have this training value. Thus we have the cults of raffia, sloyd, kindergarten gifts, special form and color work, etc. Even reading writing and numbers are often credited with peculiar disciplinary powers.

But psychologists know that a million things are disciplinary, and almost equally so if they permit the child to intelligently realize intentions which he himself has felt and conceived. Such things are those the child wants to do, and in the doing of which he must adjust means to ends until success crowns his efforts. When success of this kind is attained the child exclaims with delight and goes rejoicingly to a new task. That is the only kind of discipline which is worth while, and it can be obtained by darning a sock or wrapping up a playmate's finger more surely than by thumbing a dictionary or spelling c-a-t.

I have seen a feeble-minded girl struggle at the latter task for months without learning to do it; but the same girl learned to sew a little and gained mental comfort from it. For her the latter work was really disciplinary and the former was mental death.

The aim, therefore, should be to give to these children an opportunity to do the things which they feel to be worth while, the useful, common things, and to do them with all the intelligence at their command. It is well to begin with the child's personal habits, his clothing, the housekeeping of the schoolroom, etc. We should therefore train the child to work effectively at the simplest and most immediately useful kinds of tasks, and to keep him happy these should be interspersed with an abundance of play, games and music. Since the child has usually failed in all his previous school work, something must be found for him in which he can succeed.

It is especially desirable to begin at once cultivating in the

child the habit of doing what children should do habitually. Feeble-minded children are first and last habit-formers, and it is especially important therefore to aid them in fixing desirable habits. The teacher can begin with the room, training the children to be neat housekeepers. Scrubbing, shining things up, dusting, sweeping, cleaning windows, painting or white-washing, making curtains and hanging them, making pictures and ornaments, hanging paper, repairing locks or seats, cooking, preparing and serving lunches, caring for utensils, etc., are some of the possibilities in this line. The girls should be taught knitting and the making of aprons, dresses and other plain garments. They should be taught to iron nicely, and to wash, how to patch neatly and to keep things in order generally.

Boys, older ones at least, should be placed in separate classes from the girls because they will do a different kind of work. They should be taught to be clean, how to wash up, how to mend clothes, sew buttons, do errands, and to be orderly in their actions and mannerly in their behavior. Occupations especially suited to boys are carpet-weaving, broom-making, gardening, caring for animals, book-binding, straw hat plaiting, making window boxes, wagons, toys, balls, bats, etc. Some of these occupations it goes without saying, are suitable for girls also.

The really important thing in the conduct of all this work is to see that the child succeeds in doing something day by day which he feels is worth doing. Only thus can the feeble-minded be made happy; and who will say that it is not worth while to make such children happy, seeing that nature has closed against them so many avenues of satisfaction? The play life must not be neglected, for rightly directed it ministers not only to their happiness but to their moral and intellectual development as well.

Every special class teacher will meet her own problems and these will not be exactly the same for any two children. She must know each child, his home, his family, his life history, his physical handicaps, his faults, his virtues, his accomplishments. In order to secure such information the teachers

should be given a half day (or pay for half of Saturday) to visit homes and work up clinical records for each child.

In general, the special class teacher needs to be intelligent, to use her wits, to get informed and to have the ability to make good use of freedom, for practically absolute freedom she must have to do with her children whatever seems best for each one individually.

The above suggestions apply to special class work demanding no general change in the present school system. But the problem of home supervision and home care of defectives remains to be solved, both for the sake of safeguarding the happiness and welfare of the adult defectives and in order to check the stream of degeneracy at its source. Here, more, even than in the school management of defective children, we find ourselves without satisfactory means and methods. The problem concerns the welfare of society so intimately, however, that some kind of solution is imperative.

COMMUNICATIONS AND DISCUSSIONS.

EDUCATIONAL MEASUREMENTS OF FIFTY YEARS AGO.

Professor Edward L. Thorndike has recently received through the kindness of Dr. Isaac L. Kandel the following quotation which will be of interest to readers of the JOURNAL in connection with the recent activity in the construction of educational scales in this country.

In *The Museum, a Quarterly Magazine of Education, Literature and Science,* vol. III, 1864, pp. 480-484, there is an article on Statistics of Educational Results by E. Chadwick in advocating the need of better measurement. The article begins thus:

"Much of the scepticism prevalent as to the power and value of popular education arises from the inability of the educationist, or of the school teacher, to adduce satisfactory statistical evidence of the moral or of the intellectual results from any special courses of instruction or training, as manifested in after life."

The appendix quotes the practice of Rev. George Fisher of the Greenwich Hospital School.

"A book, called the 'Scale-Book,' has been established, which contains the numbers assigned to each degree of proficiency in the various subjects of examination: for instance, if it be required to determine the numerical equivalent corresponding to any specimen of 'writing,' a comparison is made with various standard specimens, which are arranged in this book in order of merit; the highest being represented by the number 1, and the lowest by 5, and the intermediate values by affixing to these numbers the fractions ¼, ½, or ¾. So long as these standard specimens are preserved in the institution, so long will instant numerical values for proficiency in 'writing' be maintained. And since fac-similes can be multipied without limit, the same principle might be generally adopted.

"The numerical values for 'spelling' follow the same order, and are made to depend upon the percentage of mistakes in writing from dictation sentences from works selected for the purpose, examples of which are contained in the 'Scale-Book,' in order to preserve the same standard of difficulty.

"By a similar process values are assigned for proficiency in mathematics, navigation, Scripture knowledge, grammar and composition, French, general history, drawing, and practical science, respectively. Questions in each of these subjects are contained in the

'Scale-Book,' to serve as types, not only of the difficulty, but of the nature of the questions, for the sake of future reference; observing that the same numerals are used in the same order as before, viz., number 1 denotes the highest, and the number 5 the lowest amount of attainment.

"In respect to the numerical values of 'reading,' as regards accuracy, taste or judgment, it is obvious that no other standard of measurement can be applied, beyond the interpretation of the terms 'good,' 'bad,' 'indifferent,' etc., existing at the period of examination. And the same observation will apply to the estimation of numbers of 'characters' and 'natural abilities,' as determined by the united testimony of the respective masters.

"Having stated this much with regard to the plan pursued in this school, I may well add that the advantage derived from this numerical mode of valuation, as applied to educational subjects, is not confined to its being a concise method of registration, combined with a useful approximation to a *fixed standard* of estimation, applicable to each boy; but it affords also a means of determining the *sum total,* and therefrom the means or average condition or value, of any given number of results."

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The Journal is issuing a series of Monograph Supplements for the publication of more extensive researches in educational psychology. For details prospective contributors may apply to Guy Montrose Whipple, Cornell University, Ithaca, N. Y.

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EDITORIALS.

POPULARIZED NONSENSE.

The 'popular science' of the Sunday newspaper supplement is very likely less harmful than we are sometimes disposed to fear, partly because the clientele that absorbs its information from this source is not of the type that affects the progress of science directly or indirectly, partly because even the less intelligent reader is prepared to discount somewhat the wonderful concoctions of the "scientific editor." When, however, monthly magazines of high repute, that claim the serious attention of many thoughtful laymen, spread upon their pages accounts of alleged exploits in applied psychology that are without the faintest trace of scientific truth, there can be little doubt that real harm may result to the progress of science. A typical illustration is afforded in one of the recent issues of a well-known American periodical which purports to explain how modern science can take a man, look him over, analyze his qualities and decide upon his fitness for various industrial requirements. This, it appears, is the latest thing in scientific management. We are told that an expert in this field, "by correlating certain principles of anthropology, physiology, anatomy, biology, and ethnology" [why

is psychology omitted?], has developed "certain general principles of the utmost value in assessing character and capacity." These highly important, newly discovered general principles are such as the following: a slow, deliberate, sure-footed stride usually expresses the corresponding mental qualities; to sign the name with initials only (J. B. Smith) indicates carelessness; to write it out in full pomposity, etc.; the man with a convex profile is aggressive, keen, alert, energetic, he with a slightly concave profile is of a slow, plodding, analytical type. Furthermore, all humanity is classified as predominately 'mental,' 'motive' or else 'vital,' and these types, it appears, are directly observable from the physical build, shape of face, etc. All human beings, again, are classified according to their degree of blondness and this "is of the greatest consequence," because the blond is aggressive and the brunet is a plodder, moderate, but reliable. Even this would be too simple: we must also take account of shape of head, because, forsooth, the "long-headed man is more farseeing, the short-headed man thinks only of temporary gain," while broad-headed men are "destructive, grasping and combative." One wonders, after perusing several pages of such "general principles" whether any touch of ironical humor was intended by the statement that the foremen and executives of a large Western company that has thousands of these analyses on file are no longer sceptical, but accept them on their "face value."

One would almost feel as if the expert psychologist, struggling in the attempt to adjust a system of mental tests to probe into bewildering complexity of mind, would better shut up his laboratory. It would seem to be a great pity that Stern, for instance, could not have known of all this scientific progress before he wrote his *Differentielle Psychologie.* G. M. W.

COURTIS STANDARD TESTS IN ENGLISH.

Animated by a keen realization of the need for standards of measurement in education and encouraged by the success of the standard tests in arithmetic, Mr. Stuart A. Courtis has turned his attention to English, and has devised a series of standard tests which he denominates Series C, and which is designed to reveal differences in ability in some of the fundamental aspects of that subject. The series consists of six tests, as follows: 1. Handwriting. 2. Dictation. 3. An Original Story. 4. Normal Reading. 5. Careful Reading. 6. Reproduction. In each of these the author has used the principle of time limits which proved so

fruitful in the earlier work in arithmetic. Test 1 contains ten lines of script letters, and in each line the letters are so arranged in four groups of five letters each that they form nonsense words. In one minute as many of these letters as possible are to be copied just below the printed script. The number of letters copied is noted and the product graded for quality by the Thorndike scale, and for legibility by the Ayres scale. In test 2 a simple story is dictated at a definite rate, the reader looking at the second hand of a watch and pronouncing groups of words at indicated intervals. The quality and legibility of handwriting and the mistakes in punctuation, spelling, and syntax are graded. The dictation leaves the story unfinished. For test 3 the pupils turn to a drawing which represents a continuation of the story, and are given two minutes to use their imaginations in thinking out the continuation and in supplying other adventures for the chief character. Five minutes are then given to write out the continuation. The number of words, handwriting, punctuation, spelling and syntax are graded as before. In test 4 a continuation of the narrative is read silently at a normal rate for one minute. The last word read is marked by drawing a line around it, and the number read serves as a score for rate. On another page is found the same passage, but certain selected words are enclosed in parentheses along with two synonyms each. The child is to strike out the extra words, leaving only the one used in the first version of the text. This constitutes a test of recognition memory for the words read. The pupils are to stop at the last word read before. The time record is taken by the instructor writing a digit on the board every ten seconds, and the child putting on his paper the last digit written at the time he finishes. In test 5 a further continuation of the story is read very carefully, so that every word may be reproduced. One minute is allowed, the last word read is marked by a line drawn around it, and at a signal the reproduction is begun on another page. Individual time is taken as in test 4. Finally in test 6 the instructor reads the conclusion of the story at a prescribed rate and on signal the pupils are asked to reproduce it. Individual time is noted as above. The series of tests is an extremely interesting one and deserves an extensive trial. The same co-operative terms are offered as for the previous series of tests in arithmetic. Further details may be secured from S. A. Courtis, 82 Eliot Street, Detroit, Mich.

J. C. B.

NOTES AND NEWS.

The School Review, published by the University of Chicago Press, will hereafter be under the editorial charge of Rollo LaVerne Lyman, this year appointed associate professor of the teaching of English in the School of Education. Frank Nugent Freeman, instructor in educational psychology, has been placed in editorial charge of the *Elementary School Teacher.—Science.*

According to the daily press the members of the entering class at Dartmouth College have been given a series of mental tests in addition to their physical examination.

The pedagogical library of the late Professor Aron has been purchased by the University of Illinois for its School of Education. It comprises approximately seven thousand titles, and is especially rich in documents relating to German education in the sixteenth and seventeenth centuries. It also contains rare first editions of the educational classics, and a number of valuable manuscripts.

Dr. Lewis M. Terman, associate professor of education, Stanford University, has been elected a member of the permanent International Committee on School Hygiene and has also been made the vice-president of the Council of Thirty of the American School Hygiene Association.—*Science.*

Mr. W. H. Winch, the well-known English experimentalist in education, has returned to his duties as Inspector of Schools for the London County Council, after several years' absence on leave. Mr. Winch has been devoting his time to experimental investigations on London school children,—a work which he has prosecuted with much assiduity and success. Some of the results of these investigations have recently appeared in the Educational Psychology Monograph series, and another monograph is announced for early publication in that series.

Mr. H. G. Childs, professor of educational psychology in the Brooklyn Training School for Teachers, has accepted an appointment to the chair of educational psychology in the University of Indiana.

A. L. Hall-Quest, formerly Professor of Philosophy in Westminster College, and C. L. Harlan, last year instructor in the Central Normal College, have been appointed assistants in education in the University of Illinois.

W. A. Cook (Ph.D., Wisconsin) has been appointed High School Visitor for the University of Colorado.

Dr. Thomas J. Kirby, Columbia University, formerly supervisor of industrial schools in New York City, has been elected professor of elementary education in the University of Pittsburgh.

C. A. Ruckmich (Ph.D., Cornell) has been appointed instructor in psychology at the University of Illinois, and Thomas Vance (Ph.D., University of Iowa) has been made assistant in psychology in that institution.

At Cornell University Dr. W. S. Foster (Ph.D., Cornell) and Mr. E. G. Boring have been made instructors in psychology, and Mr. D. Kennedy-Fraser (M.A., Edinburgh), recently Volunteer Assistant with Professor Meumann at Hamburg, has been made Assistant in Educational Psychology.

Dr. Frank P. Graves, of the Ohio State University, has been appointed professor of the history of education, and Dr. Harlan Updegraff, of Northwestern University, professor of educational administration at the University of Pennsylvania. Professor A. Duncan Yocum, who has occupied the chair of pedagogy at that institution, will continue as professor of educational research and practice.

A graduate school of education has been established at Bryn Mawr College. It is under the charge of Professor Kate Gordon, associate professor of education, Dr. Matilde Castro, director of the model school, and Professor James H. Leuba, professor of psychology. Professor Leuba will give a graduate course on the psychology of defective and unusual children.—*Science.*

William A. McKeever, professor of philosophy in the Kansas State Agricultural College, and author of the well-known Home Training Bulletins, has been appointed professor of child welfare in the University of Kansas, perhaps the first chair of the sort to be established in the United States.

PUBLICATIONS RECEIVED.

(Notice in this section does not preclude a more extended review.)

L'Année psychologique, fondée par Alfred Binet. Dix-huitième année (1912), publiée par LARGUIER DES BANCELS et le DR. TH. SIMON. Pp. 526. 15 fr.

It is reassuring to know that this important yearly volume will not perish though death has deprived psychology of the services of its founder, Alfred Binet. The 18th volume contains no summary of the literature, however, and in this respect differs markedly from its predecessors. Readers will find particular interest in the excellent likeness of Binet that forms the frontispiece and in the two articles descriptive of Binet and his work by the present editors. In addition, the volume has importance for educational psychology chiefly in the series of articles upon the Binet scale and other tests of the intelligence of children written by Bobertag, Goddard, Saffiotti, and others.

KENDRIC CHARLES BABCOCK. *Accredited Secondary Schools in the United States.* Bulletin No. 539. Washington: Bureau of Education, 1913. Pp. 65.

A brief discussion of the growth of high schools and of the definition of accredited school is followed by a detailed list of all accredited schools in the United States with their principals and their standing with such organizations as the North Central Association.

WILLIAM TENNY BREWSTER. *Writing English Prose.* Home University Library. New York: Henry Holt & Co., 1913. Pp. 256. Fifty cents, net.

This is a treatise on style in English prose, and the principles laid down are copiously illustrated with examples from standard writers. Many of the illustrations show very clearly the types of expression to be avoided, as well as those to be imitated. It would be an excellent text for an advanced class in English.

L. CELLERIER ET L. DUGAS. *L'Année Pédagogique. Deuxieme Année,* 1912. Paris: Felix Alcan, 1913. Pp. vii, 524. Fr. 7.50.

This valuable classified list of educational publications for last year contains 2721 titles. Every reference is annotated, so that the

work presents a reliable picture of current activity in educational discussions. Of the five original articles on general educational themes, that of L. Cellerier on "Education and the Will" is in many respects the most interesting.

Committee on School Lunches of the Home and School League. Second Annual Report. 1911-1912. Philadelphia: 1913. Pp. 31.

A detailed report on what is perhaps the most extensive experiment in school feeding in the country.

Concepts, Their Formation and Use. Fitchburg, Mass.: State Normal School, 1913. Pp. 28.

This little brochure was developed and issued by the Class of 1913 of the State Normal School at Fitchburg, Mass., and represents part of their regular work in psychology. In an introduction the class teacher, Mr. E. A. Kirkpatrick, explains that the study is similar to those of previous classes on Habit, Memory, Imagination and Attention, and that it represents the combined wisdom and best thought of the class as worked out by committees. The topics treated are "The Nature of Concepts," "The Formation of Concepts," "Judgment and Reasoning," "Teaching Children to Form Concepts," and "Teaching the Use of Concepts."

S. A. Courtis. *The Reliability of Single Measurements with Standard Tests.* Reprinted from Elementary School Teacher, Vol. 13: No. 7, March, 1913, and No. 10, June, 1913. 326-345, 486-504.

In these articles the author replies to the criticisms of Otis and Davidson on the reliability of a single trial of test No. 1 as a measure of ability in addition. The author claims that the test was there put to a use for which it was not intended, and hence undesirable results are not surprising. The agreement of the results in tests 1 to 4 with those obtained in test 7 is considered a good index of reliability. A careful study of the results of standard testing leads to the conclusion that "The basic factor in education is thus the fact of individual differences in natural ability, and the supreme problem of the future is the working out of administrative methods of dealing with large masses of children, yet at the same time giving to each child the special attention and the special courses it needs, without sacrificing the benefits of class work and group instruction. Only as the Courtis Tests aid in this "discovery of the individual" and the laws of his development will they have accomplished their purpose."

JULIA D. DRAGOUMIS. *Under Greek Skies.* (The Little Schoolmate Series.) New York: E. P. Dutton Co., 1913. Pp. xxi, 305. $1.00 net.

These delightful stories of children in modern Greece constitute excellent material for supplementary reading in elementary schools. They will be valuable in both geography and history. No child who reads about Mattina and Pavlo and Alexander can fail to have a vivid picture of modern Athens with its magnificent store of classic treasures.

Education in the South. Bulletin No. 540. Washington: Bureau of Education, 1913. Pp. 87.

Abstracts of papers read at the sixteenth Conference for Education in the South, held at Richmond, Va., April 15-18, 1913. Among the topics considered were co-operation, the rural problem, farm demonstration work, the country church, taxation reform, education of women in the country, problems of the rural school, training of teachers, high schools in the South, college extension work, the trend in negro education, and higher education of women.

GEORGE H. EDWARDS, JR. *The School as a Social Center.* Bulletin of the University of South Carolina, No. 35, Pt. II, Oct., 1913. Pp. 73.

A good summary of the Social Center movement, and a report on the progress of the movement in South Carolina. Perhaps the most valuable part of the bulletin is the 25 page bibliography.

HENRY PRATT FAIRCHILD. *Immigration: A World Movement and its American Significance.* New York: The Macmillan Company, 1913. Pp. xi, 455. $1.75 net.

The charge is frequently made that teachers as a class are woefully ignorant of current problems. The charge is probably false, for there are thousands of teachers who deliberately make of their class exercises occasions to train their pupils in rationally estimating the significance of current happenings. For such teachers, and for all thoughtful educators the present book will be of great value. It has been rightly said that the school is the great Americanizer. Both immigrants and native born Americans have recognized its value in training foreigners for American citizenship. Such service will be more intelligently rendered if teachers who come in contact with foreign born children will read and ponder over this scholarly discussion of immigration conditions.

CHRISTINE FREDERICK. *The New Housekeeping: Efficiency Studies in Home Management.* New York: Doubleday, Page & Co., 1913. Pp. xiv, 266. $1.00 net.

An intelligent effort to apply the new principles of industrial efficiency to that important and wide spread industry of housekeeping. It is already generally conceded that cooking and the elements of domestic economy should be introduced into the schools, but little thought has yet been given to fitting the kitchen with the best tools, arranging them in the most accessible manner, reducing the number of movements to a minimum, keeping proper records of income and outgo, and in general making the kitchen as efficient as the factory. Compared with Europeans we Americans are said to be a nation of wasters. There is no place to teach economy like the home. The development of economic and efficient methods of housekeeping is a task worthy the best thought of educators, and the present book consitutes a distinct contribution to the subject.

FUNK AND WAGNALLS' *New Standard Dictionary of the English Language.* New York: Funk & Wagnalls Company, 1913. Pp. xxxviii, 2916. $30.00.

This huge volume represents all that the latest developments in lexicography could offer, and that profuse expenditure of money could procure. The statement of the New York Sun that it is "The dearest single volume to produce in the world, and the cheapest to buy, considering its contents" is doubtless true. It has taken almost four years to prepare, over three hundred and eighty editors have been employed on it, and the total cost has been almost a million and a half. Points of excellence are: All words included in one alphabetical order, thus saving time, pronunciation keys at the top of the page so that they are easily read, rules for grammatical and rhetorical construction, correction of common errors of speech, inclusion of dialectical terms, special key for scientific pronunciation, antonyms as well as synonyms given, and all the latest terms in the arts and sciences edited by specialists. Review will follow.

HERBERT BRANSTON GRAY, D.D. *The Public Schools and the Empire.* London: Williams and Norgate, 1913. Pp. xx, 374, 6s net.

A thoughtful, well-balanced examination of the English public schools in their history and their present attitude toward the training of youth. The author has had thirty-five years' experience in English schools and has occupied educational positions of national importance. He regards "the existing condition of English education with anxiety, as being chaotic, inefficient, and ill suited to the temper

of the times and country in which we live. It is out of joint with the industrial needs of the times; it is too narrow for a country which aspires to keep intact the bonds of sympathy which tie the Overseas Dominions to the Motherland."

WINFIELD SCOTT HALL, PH.D., M.D. *Sexual Knowledge.* Philadelphia: International Bible House, 1913. Pp. 320. $1.00.

A much advertised book which sets forth in simple language the essential facts about sex. There is nothing novel in the treatment, but it is a straightforward, dignified account of the things which every person should know. The best authorities on individual and social hygiene are quoted, and the quacks that prey upon ignorance are painted in their true colors.

PAUL H. HANUS. *Report on the Educational Aspects of the Public School System of the City of New York. The Report as a Whole.* New York: Committee on School Inquiry, 1913. Pp. 93.

This discussion is valuable not only because it presents in condensed form a summary of the conclusions reached by each of the investigators in the New York City inquiry, but also because it embodies a survey of the whole field of modern urban education, and indicates standards and criteria of educational success.

ERNEST C. HARTWELL. *The Teaching of History.* Boston: Houghton Mifflin Co., 1913. Pp. viii, 71. Thirty five cents, net.

"The reader into whose hands this volume falls will be deeply interested in the ideals of teaching implied in the concrete suggestions given in the following pages, for after all the value of any system of special methods rests, not merely on its apparent and immediate psychological effectiveness, but also on the social purposes which it is devised to serve. It must be recognized at the outset that history has a social purpose."

FREDERICK L. HOLTZ. *Principles and Methods of Teaching Geography.* New York: The Macmillan Company, 1913. Pp. xii, 359. $1.10 net.

The author emphasizes the fact that while geography might be made, and ought to be made, one of the most interesting and fascinating of all school subjects, interest is all too frequently killed by a dull and dry presentation of isolated facts remote from the thought life of the pupils. How to so present the data of geography that it will stimulate and be adjusted to children's thinking is the theme of this book. The style is simple and attractive, and the suggestions for

reading, if followed out, will greatly enrich the resources of the geography teacher.

CHARLES H. JUDD. *List of Approved Colleges and Universities in the North Central Association of Colleges and Secondary Schools for 1913.* School Review Monographs, No. 4. Chicago: University of Chicago Press, 1913. Pp. 32. Twenty five cents, net.

An interesting discussion of the criteria of approval, the control and organization of approved institutions, admissions, registration, degrees, graduate study, preparatory departments, size of college classes, hours of instruction, training and salaries of the faculty, and material equipment.

GEORG KERSCHENSTEINER. *The Idea of the Industrial School.* Translated from the German by Rudolf Pintner. New York: The Macmillan Company, 1913. Pp. xi, 110. Fifty cents, net.

In this little book the foremost authority on industrial education in the world sets forth his ideas as to the purpose and duties of the public schools. These duties are (1) preparation for a vocation, (2) teaching the ethical value of a vocation, (3) teaching the ethical value of the community within which the vocation is carried out. An appendix gives an account of the organization of industrial training in the elementary schools of Munich.

C. LEVADITI, A. MARIE ET J. BANKOWSKI. *Le tréponème dans le cerveau des paralytiques généraux.* Reprinted from Annales de l'Institut Pasteur, Vol. 27: No. 7, July, 1913. Pp. 20.

The authors confirm the discovery of the spirochete of syphilis in the brains of those who have shown the symptoms of general paralysis, and present evidence to prove that this mental disease is due to the gradual destruction of the neural tissue by the micro-organism indicated.

P. M. MAGNUSSON, PH.D. *Psychology as Applied to Education.* New York: Silver, Burdett & Co., 1913. Pp. ix, 345.

In this day of experimental pedagogy and the scientific study of educational problems in and of themselves one is inclined to look askance at the effort to apply psychology to education. Nor does one find any echo of experimental study in this book. What one does find is a series of simple, easy, plain, talks, somewhat after the manner of James, grouped largely under the topics of formal psychology. With this aim in mind it must be admitted that the author has

acquitted himself well of his task, and that the young student will find much in the book that will stimulate his thought and give him a better attitude toward his work. The exercises at the end of each chapter evince much originality, and constitute one of the distinctive features of the book.

EUGÈNE MARTIN. *Psychologie de la volonté.* Paris: Felix Alcan, 1913. Pp. iv, 176. Fr. 2.50.

If one accepts Angell's definition of will as "The whole mind active," then any psychology of the will resolves itself into a general psychology with emphasis upon action. Now action is a blanket term covering the most varied types of response to situations, and as the scientific way of approaching the subject would be to experimentally explore as many typical responses as possible, and draw conclusions from the results obtained. This laborious method of procedure does not commend itself to the French mind, however, and Professor Martin goes merrily on with his theoretical analysis, quite oblivious of the work of Ach and the Würzburg school. His reflections are based largely on the psychology of Kant, Herbart, Spencer, Ribot, and James.

Medical Inspection of Schools in Philadelphia. Reprinted from the Annual Report of the Department of Public Health and Charities for the Year 1912. Philadelphia: 1913. Pp. 116.

Includes the report of the inspector for parochial and private schools, of the eye dispensary, of the dental dispensary, and of the director of medical inspection of the public schools. A sixteen page insert of graphs, charts, etc., shows exactly how the reports are made, presents the results in graphic form, and adds very materially to the value of the discussion.

E. MEUMANN. *The Psychology of Learning. An Experimental Investigation of the Economy and Technique of Memory.* Translated from the third German edition by John Wallace Baird. New York: D. Appleton & Co., 1913. Pp. xix, 393.

The little one hundred page pamphlet "Ueber Oekonomie und Technik des Lernens" of 1903 has grown in subsequent editions to the ample volume which, thanks to Dr. Baird, is now made accessible to English readers. This growth in size is paralleled by a corresponding growth in scope, and the book in its present form constitutes a fairly complete psychology and pedagogy of memory. The intent of the author is best indicated by quoting from Professor Meumann's preface to the American edition. "It is the aim of the present monograph to meet this urgent demand for methods of learn-

ing which shall be psychologically most appropriate, and which shall embrace all of the different kinds of learning. It begins with methodical observation as the basis of all memorial work. It seeks to develop rules for systematic observation. It discusses the most favorable subjective and objective conditions for mechanical memorization; and it endeavors to establish at least a few of the cardinal points for the retention of logical associations.—a process whose nature is still imperfectly known. Our present knowledge of the economy and technique of learning is still in need of being supplemented by practical instructions as to how best to master the various concrete tasks with which the pupil is daily concerned."

E. MEUMANN. *Vorlesungen zur Einführung in die experimentelle Pädagogik und ihre psychologischen Grundlagen.* Zweiter Band. Zweite umgearbeitete und vermehrte Auflage. Leipzig: Wilhelm Englemann, 1913. Pp. xiv, 800. M. 11. Geb. M. 12.15.

The second volume of this encyclopedic masterpiece of Professor Meumann's fully sustains the reputation for thoroughness and inclusiveness made by the first. The volume deals with individual psychology as a basis for pedagogy, and devotes much space to summarizing the tremendous output of literature in the past few years on the experimental study of capacities and on tests of intelligence. Almost two hundred pages are given to the discussion of the Binet tests alone. A further one hundred and eighty pages present the methods and results of other investigators of capacities, as Rossolimo, Spearman, Thorndike, Whipple, Goddard, Sharp, Wreschner, Stern, Bobertag, Pohlmann, Burt, and Meumann himself. The twelfth lecture sums up the net results of all these studies of individual differences in capacity, requiring two hundred pages for the summary, and lecture thirteen closes the volume with one hundred pages on the practical problems involved in these studies of intelligence. Professor Meumann is one of the most catholic of German writers in his evaluation of the contributions of American, English and French experimenters. He shows his thorough mastery of the whole field, and approaches his task in a truly international spirit. His work is therefore a mine of information on current activities in the field of experimental education. The third volume will deal with experimental studies of the teaching process.

MARIA MONTESSORI. *Pedagogical Anthropology.* Translated from the Italian by Frederic Taber Cooper. New York: Frederick A. Stokes, 1913. Pp. xi, 508. $3.50 net.

There is a growing recognition of the claim that pedagogical theory must be rooted in biology and anthropology, and must de-

velop in the atmosphere of social needs. It is fortunate for the wider spread of this idea that the leader of what promises to be a veritable cult in primary education has published a work on the application of anthropological studies to education, and that this work is now offered to English readers. It is indeed an imposing volume, replete with tables, diagrams, and plates, and in its American dress reflects much credit on its publishers. The ten chapters deal with principles of general biology, craniology, the thorax, the pelvis, the limbs, the skin and pigments, technical procedure, statistical methodology, the biographic history of the pupil and his antecedents, and the application of biometry to anthropology. While much of the material deals with adult rather than child anthropology, this only serves to emphasize the need for more extensive data on the physical development of children. The book is a useful contribution to pedagogical literature, and we congratulate the translator and the publishers on its production in English.

LOUISE MONTGOMERY. *The American Girl in the Stockyards District.* Chicago: The University of Chicago Press, 1913. Pp. 70. Twenty five cents.

This investigation, carried on under the direction of the Board of the University of Chicago Settlement and the Chicago Alumnae Club of the University of Chicago, deals with the educational standards of the community, the local schools, the girl as a wage-earning child, the working girl, and problems of adjustment.

H. N. MORSE, E. FRED EASTMAN AND A. C. MONAHAN. *An Educational Survey of a Suburban and Rural County, Montgomery County, Md.* Bulletin No. 542. Washington: Bureau of Education, 1913. Pp. 68.

Among the recommendations made are more assistant superintendents, thus securing better supervision, reorganization of the course of study, and reduction of the number of schools by consolidation and concentration.

The Newton Public Schools. What they are trying to do and with what success. Annual Report of the School Committee, Newton, Mass. Vol. 74, 1912.

Superintendent Spaulding's report contains not only complete tables and charts, but forceful preachments on educational policy, and an artistic plan for setting forth the salient points which he wishes to emphasize.

FRANCIS W. PARKER SCHOOL YEAR BOOK. *The Morning Exercise as a Socializing Influence.* Chicago: Francis W. Parker School, 1913. Pp. 198. Thirty five cents.

The selections presented include exercises showing types of preparation, exercises reported verbatim, exercises emphasizing school unity and school policies, exercises for special days, and miscellaneous excercises. A valuable adjunct is a classified list of morning exercises.

HOMER H. SEERLEY. *The Country School.* New York: Charles Scribner's Sons, 1913. Pp. xx, 218. $1.00.

Practical advice to country school teachers by one who was raised on a farm and who has spent twenty five years of his life training country boys and girls to teach school. The discussion includes a consideration of the relation between the school and the community, the organization of school and community, the course of study, management and government of the school, program and course of study, standardization, agriculture, and the supply of teachers. Out of the abundance of his experience the author has much to say that will be helpful to the country school teacher.

J. F. SHEPARD AND F. S. BREED. *Maturation and Use in the Development of an Instinct.* Reprinted from the Journal of Animal Behavior. Vol. 3: No. 4, July, 1913. 274-285.

Is the improvement in the pecking reaction of chicks due to practice or to the increasing maturity of the organism? Chicks kept from pecking for three, four, and five days after hatching (being kept in a dark room and fed artificially) showed very poor results on the first two days. After that the improvement was about normal. A certain amount of practice is necessary but in delayed pecking a limited amount of practice carries with it an exceptionally rapid improvement. The most of the ordinary improvement thus seems due to maturation.

SUSAN B. SIPE. *Good Roads Arbor Day.* Bulletin No. 536. Washington: Bureau of Education, 1913. Pp. 29.

"The material in this pamphlet is about equally divided between good roads and tree planting. The people must be educated on the subject of roads before much tree planting can be done."

Special Features in City School Systems. Bulletin No. 541. Washington: Bureau of Education, 1913. Pp. 61.

A tabulation of replies from school superintendents describing plans or methods they had worked out in their schools during the past few years.

ALVA WALKER STAMPER. *A Textbook on the Teaching of Arithmetic.* New York: The American Book Co., 1913. Pp. 284. $1.00.

The book gives an interesting history of the subject; an account of the reasoning involved in arithmetic, in which are discussed the logical types and the application of induction and deduction to various kinds of problems; a brief treatment of the scope and value of algebra and geometry in the elementary school; and a general lesson plan, with ten plans worked out in detail giving advice as to modes of instruction and detail of routine work.

ARTHUR H. SUTHERLAND. *Critique of Word Association Reactions. An Experimental Study.* Published by the author, University of Illinois, 1913. Pp. 46.

The reasons for delayed reaction or failure to react are many, and vary with individuals. The Freud School is certainly in error in assuming that such inhibitions are due to sex traumata alone.

ARTHUR JAMES TODD. *The Primitive Family as an Educational Agency.* New York: G. P. Putnam's Sons, 1913. Pp. x, 241.

The author, who is a member of the department of sociology in the University of Illinois, has had two classes of students in mind: Those who desire an outline sketch of the early evolution of the family, and those who feel the lack of materials illustrating methods and organization of primitive education. It is in the educational aspect of the inquiry that the author himself is most interested. The educational question takes the following form: "If the family has heretofore been the basic educational agency but is losing its educational efficiency, can we devise a more adequate type of education with other social institutions predominant in its foundations?" The result is an interesting and thought-provoking book which develops some rather novel points of view.

MAX VERWORN. *Irritability. A Physiological Analysis of the General Effect of Stimuli in Living Substances.* New Haven: Yale University Press, 1913. Pp. xii, 264. $3.50 net.

Once again the student of behavior is placed under obligation to the directors of the Silliman Memorial Lectures at Yale University

for a comprehensive presentation of recent investigations on the responses of living substance. Six years ago Sherrington delivered his lectures on the Intergrative Action of the Nervous System,—a work which has formed the basis of all discussions of the reflex arc since that time, and which has furnished the central principle for at least one modern textbook on psychology (Pillsbury). Now Professor Verworn, the greatest living authority on general physiology, has welcomed the opportunity afforded by the University's invitation to summarize "the results of numerous experimental researches carried out in the physiological laboratories of Jena, Göttingen, and Bonn, to unite therewith the results obtained by other investigators, and thus to present a uniform exposition of the general effects and laws of stimulation in the living substance." Some of the chapter headings are the history of the subject, the nature of stimulation, characteristics of stimuli, general effect of stimulation, process of excitation, conductivity, refractory period and fatigue, interference of excitations, and processes of depression.

W. H. WINCH. *Inductive versus Deductive Methods of Teaching: An Experimental Research.* Educational Psychology Monographs, No. 11. Baltimore: Warwick & York, 1913. Pp. 146. $1.25.

Which method gives the best results in teaching geometrical definitions, induction or deduction? Experimental investigation in five schools showed that where exact reproduction is required the deductive method works best with the younger pupils and the inductive method with the older ones. When tested by their ability to apply themselves to new material those who had been taught inductively did better in every case than those taught deductively. Tests of deferred reproduction showed some slight advantage in favor of inductive teaching, but not enough to surpass the results of deductive teaching with young pupils.

ROBERT M. YERKES, A.M., PH.D., AND DANIEL W. LA RUE, A.M., PH.D. *Outline of a Study of the Self.* Cambridge, Mass.: Harvard University Press, 1913. Pp. 24. $1.00.

This is an extremely interesting undertaking along the line of Stern's psychographie. The outline is bound in loose-leaf form, so that additional sheets containing personal records may be inserted at will in their appropriate places. The outline includes (1) the ancestral history of the self, (2) the development or growth of the self, (3) the self of today, and (4) the significance of the characteristics of the self. Each of these topics is subjected to a minute analysis, and detailed questions and instructions are given for filling out the record on each point. In the ancestral history the elaborate

"Record of Family Traits" from the Eugenics Record Office of the Carnegie Institution is incorporated in the outline, and under the marital relations in the last section the still more elaborate "Index to the Germ-Plasm" from the same institution is included. The authors state that "The purpose of this study is threefold: first, to help you to understand yourself and to become a useful and happy member of society; second, to help you to understand and sympathize with other persons, especially children, and to further their development; third, to arouse your interest in the facts of heredity, of environmental influence, and in the significance of the applied sciences of eugenics and euthenics." The outline is still in tentative form, and the authors would be glad to have psychologists and educators fill it out and criticize the plan.